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BSC CityLab: Teaching Tomorrow's Technology to Today's Youth

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than the success of the company (this fits Collins’ Level 4 leader). She combined impressive visions with charismatic but egalitarian and demanding styles. CEOs need to place their organizations’ well-being above all else, including themselves. Fiorina failed to understand the dynamics of HF and lacked a technical background, and the board’s efforts to appoint a strong chief operating officer failed to offset her expertise in its operations. In addition, she is accused of firing three top executives after HF missed earnings targets as a way of deflecting attention away from herself.

HP is obviously in need of major transformation. The new CEO will need to develop a vision and strategy to undertake a force global competition, lead major technology initiatives and transform poor employee morale. Vision is the force that creates the future. Leadership is a dialogue, not a monologue. Leaders ignite their constituents’ flame of inspiration. HF’s next CEO should be a transformational leader, someone who can change the status quo by articulating to followers the problems in the current system and a compelling vision of what a new organization should be. On April 1, 2005 former CEO and president of NCR Mark Hurd assumed the position as HF’s CEO and president. Hurd’s style is in sharp contrast to Fiorina. He spent 25 years at NCR, cultivating in a two-year term as CEO where he quietly led an ambitious turnaround of the company. He was seen as a relentless cost-cutter familiar with nearly every facet of management. His leadership was marked by successful efforts to improve operating efficiency, increase the position of NCR’s product line, and build a strong leadership team.

A classical transformation process can be viewed as a four-phase process. The first step is to recognize the need for change. In John P. Kotter’s book Leading Change, his process of creating major change calls first for establishing a sense of urgency, wherein the market and competitive realities are examined and major opportunities are identified. HF definitely senses such a sense of urgency. The second phase of transformation calls for creating a new vision, followed by managing transition, and finally institutionalizing the change. Some have described transformational leaders as motivating followers to strive for higher-level values and morality. Such leaders use the consciousness of followers to reflect real societal needs and values rather than personal self-interest.

While much in the media has been paid to CEO’s who have been unsuccessful, spotlight should be placed on leaders who have been successful in transforming or propelling their organizations forward. HF would be wise to heed the transformation process of one of its main competitors, IBM. Under the leadership of its former CEO Louis V Gerstner, Jr. Gerstner led one of the most dramatic corporate turnarounds in business history. He became CEO in 1993 when IBM was near collapse because of its lumbering size, insular corporate culture, and lack of understanding of what its customers needed for computing solutions. He led a corporate transformation and re-established IBM as a leader in its traditional mainframe and large-server markets. CEOs Anne Mulcahy of Xerox and Ed Breen of Tyco have turned around their companies through no-nonsense leadership with strict financial controls. Following in the wake of charismatic leader Jack Welch, Jeffrey Immelt of General Electric has transformed GE by creating a customer-driven, global, and diverse culture.

Strong and effective leadership is also vitally important in the not-for-profit sector, specifically higher education institutions. Their institutions operate in increasingly complex environments where an adaptation to environmental changes is critical. Effectiveness of organizations is influenced by the degree of fit between organizations and their environment. How effective a college or university is at capitalizing emerging opportunities and addressing threats depends on leadership’s ability to cultivate a strategic mindset among individuals within the institution.

Change needs to be viewed as an opportunity, not a threat. Pressure on academic leaders for accountability (particularly in the form of learning outcomes), increasing competition from not-for-profit institutions and for-profit institutions (for-profit University of Phoenix in particular with over 300,000 students and continuing to grow), and reduced state funding has created the need for strong, capable leadership. Dean DeStefano of the Boston College School of Education has met this challenge on many fronts and has systematically shown strategic leadership. The college initiated this process under President Emerita Anna Tinales, who led an entire college community that was involved in developing the Vision Statement. Building upon this foundation, President Dana Mohler-Ferch is leading a sophisticated strategic planning process so that all of us at the college think more clearly and strategically about the future.

—Dorothy J. Mulcahy is Professor of Management.

BSC CityLab: Teaching Tomorrow’s Technology to Today’s Youth

by Jeffery Bowen

SELECTED BIBLIOGRAPHY


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After the orientation, you and twenty-three other new employees move into the laboratory to begin your training. The lab looks very high-tech with all of its equipment and instrumentation along with its strange names; things like microcentrifuge, pipettor, and a gel electrophoresis apparatus. This place looks exciting and you are glad that you were hired for this week-long special assignment.

The new hires, or Junior Scientists as you’re called, break up into teams of three to begin the process of learning how to use the equipment. The Senior Scientists are busy explaining how the equipment is used, and since the equipment is like nothing you have ever used before, you are glad to have some help with learning how to use it properly. You notice that each team has a team name. Suddenly, it dawns on you that you recognize the names—they are famous scientists! You are proud to be on Team Watson, named for one of the scientists that discovered the three-dimensional shape of DNA.

Then something strange happens. As you and your team are learning to use the pipettor, a device used to measure very small volumes of liquids, you noticed that the lab became quite busy with activity. This was shortly after a phone call that Dr. Mike made about some packages that were just delivered to the front desk. You knew this because Dr. Mike asked Dr. Pat and Dr. Meri (two other Senior Scientists) to pick up the packages. They return with a cart full of boxes and every box is marked “Evidence.” Dr. Mike called a meeting with some of the Senior Scientists while everybody went on break.

Upon returning from break, Dr. Mike explains to Junior and Senior Scientists that the boxes are evidence from a very important and ongoing case that BAFL has been investigating. He goes on to explain that the boxes of evidence came from one of BAFL’s field agents, a scientist named Jonah Cetaceus. Jonah and the rest of BAFL have been investigating the illegal capture and sale of whale meat in seaports and fish markets around the world. Jonah has recently obtained samples that need to be verified as to whether they are whale meat and, if so, to which species of whale they belong. Observation of the samples indicate that all three samples in your box look like they are different, but you don’t know what each sample is. As it turns out, all the other teams are having the same problem… the Senior Scientists will need to talk to Jonah about this.

It is now time for a brainstorming session with all the scientists to figure out how to determine which sample is whale meat, or whether they all muscle. As a company, you figure out that tissues taken from different organs, like muscle or liver, are going to look different under the microscope. If you look at the arrangement of the different tissue types, then maybe you can determine the organ of origin for each sample. Sure enough, by the end of the first day, you know which sample is muscle and you can begin the process of protein fingerprinting.

Dr. Mike seemed worried that the training was cut short by the arrival of the important case, but you and the rest of the Junior Scientists convince him that you are ready to facilitate training of protein fingerprinting, everybody breaks up into Expert Groups. There are three Expert Groups with one Junior Scientist from each team. The Expert Groups are to take a crash course in a particular technique and then bring it back to the team and train the other members. You found that this approach works very well, especially since you are the Gel Loading expert.

Wow! What a first day of work and it’s only lunch time! Throughout lunch, there were all sorts of rumors and speculations flying around. The one that the most intriguing was that BAFL’s and their scientists may be subpoenaed to testify before a Congressional Hearing on Endangered Species. While you hope that you don’t get subpoenaed, you would like to help and it would be interesting!

Now that you and your team have enough training, you are ready to begin collecting samples when you return from lunch. Jonah is a well-trained field operative and, as such, knows which samples are the best for protein fingerprinting and how to prepare them for future study. With that being said, you didn’t expect any problems. Fortunately, there are eight evidence boxes and eight teams. Your team retrieves its designated evidence box and you begin your observations of the sample.

However, there seems to be a major problem! It appears that Jonah placed three samples into each evidence box. He did, however, mark each sample as A, B, or C. The problem is that when he packed them in ice to send them, the paper identifying each sample got wet and you can’t read it anymore. This is a major problem since you need a piece of muscle tissue which contains a lot of protein to run the protein fingerprint. Guess observations of the samples indicate that all three samples in your box look like they are different, but you don’t know what each sample is. As it turns out, all the other teams are having the same problem… the Senior Scientists will need to talk to Jonah about this.

In addition to the inquiry-based scenario adapted by the summer programs, another great advantage to this program is the outstanding help of Bridgewater State College faculty, staff, and students. The faculty that work on this summer program include four Biology professors (Drs. Jeff Bowen, Michael Cannon, Meredith Krevsky, and Patricia Mancini), a Chemistry professor (Dr. Frank Gorja) as well as an English professor who plays the role of our company lawyer and helps the students prepare their testimony (Dr. Anne Doyle) in addition to the Program Coordinator (Ms. Cathy Hart, BSC ’02). The program also enlists three or four undergraduate interns who are interested in a career in teaching. The high instructor to student ratios works very well and the students get a chance to work with real scientists and professors.

Additionally, the students are doing real science and using real biotechnology equipment to help them solve a problem. The students are doing real science and using real biotechnology equipment to help them solve a problem. The students are doing real science and using real biotechnology equipment to help them solve a problem. The students are doing real science and using real biotechnology equipment to help them solve a problem. The students are doing real science and using real biotechnology equipment to help them solve a problem. The students are doing real science and using real biotechnology equipment to help them solve a problem.
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The interaction between the “Senior Scientists” and the students is critical in our summer programs as is also evident in our high school level summer program called Thread of Evidence. In Thread of Evidence, students run the Forensics Institute at Bridgewater (or FIB, as we like to call it) and need to use biotechnology to solve a case of industrial espionage and kidnapping that occurs within the company when one of the Senior Scientists turns up missing and there is evidence of foul play. High school students tend to be a little skeptical of stories like this, we are upfront that we are playing a game such as a murder-mystery dinner and they are welcome to play along with us. As long as we are upfront with the students that we are not trying to convince them that this is a real situation, they invest themselves in the story. As the program moves forward, rumors and accusations run rampant as the students use DNA evidence and other biotechniques at their disposal to lead them to the primary suspect…another Senior Scientist.
The students have to prepare their evidence and present a hypothetical version of what happened on the evening the scientist disappeared.

CLASSROOM VISITATIONS

All of our modules, be it for week-long programs like Whale of a Mystery and Thread of Evidence or for one-day experiences for local schools, are based on a case or mystery that students have to solve. The modules that are offered in one-day experiences include a pre-laboratory exercise that is done in the classroom to provide the background and the mystery that needs to be solved. As with the summer program, the storylines are designed to be open-ended to help the students “discover” the best way to solve the problem. The only way to solve these mysteries is to use modern biotechnology. The lab equipment is only there to help find an answer, not the other way around.

The most popular module is The Mystery of the Crooked Cell that was originally developed at BUSM CityLab. This module for middle school aged students explores sickle cell syndrome with the progression-of-inquiry approach. Students begin with a description of a patient with symptoms of some sort of malady. Through a series of inquiry-based and hands-on steps, they can determine that the disorder is indeed sickle cell syndrome. After obtaining a “sample” of the patient’s blood, they perform a series of tests to definitively prove their hypothesis: case solved!

For high school students, BSC CityLab has developed “Chances Are?,” a follow-up to the middle-school module based on sickle cell syndrome described above. In this module, high school students play the role of genetic counselors and learn how to correctly develop and analyze a pedigree, decide which family member(s) should be tested, and use polyacrylamide electrophoresis to run the diagnostic test. In addition to the biotechnology needed for this module, students must also face and discuss some of the ethical dilemmas people face surrounding the knowledge that can be garnered from knowing your genetic make-up.

TEACHER TRAINING & LENDING LAB

BSC CityLab has historically been very involved in providing opportunities for pre- and in-service teachers through courses in support of the Masters of Art in Teaching program and workshops throughout eastern Massachusetts. The courses that the faculty offer serve two major functions. The first is to provide area teachers with content knowledge in the area of Biomedicine and Biotechnology that they can take back to the classroom and expand the teachers’ knowledge base. The second major function is to provide teachers with alternative pedagogical strategies that they can use in their classrooms and the training to become proficient in the techniques associated with the modules.

Once teachers are trained, they will be able to borrow equipment, supplies, and reagents to take back to their classroom through BSC CityLab’s Lending Lab program. Efforts are currently being put forth by BSC CityLab to expand the Lending Lab program. Although we recognize the intrinsic value of having area students come to Bridgewater State College and BSC CityLab, we also realize that many school districts are facing financial difficulties and cannot absorb the cost of a substitute teacher and busing required for a BSC CityLab visit. Many of the modules that are run in BSC CityLab have been modified to work in a classroom with the time and space constraints that teachers face.

FUTURE OF BSC CITYLAB

Unfortunately, federal and grant monies are sparse for programs that are designed for children and the programs and grants that do support such activities are very highly competitive. BSC CityLab was fortunate to receive the seed money from the SEPA grant. However, for BSC CityLab to continue, we must get BSC CityLab institutionalized and create an endowment for the continued development and running of our modules and programs. To this end, BSC CityLab is continuing to pursue granting opportunities and has begun a campaign to raise the finances to keep this outstanding program going. Additionally, BSC CityLab is seeking to become formalized as an established center on campus that would provide the basic infrastructure and necessities to run the programs. If you are interested and would like to help BSC CityLab educate our children in the uses and applications of science, especially biotechnology, please feel free to contact us at CITYLAB@bridge.edu or you may contact the director of BSC CityLab, Dr. Michael Carson (mjcarnon@bridge.edu).

—Jeffrey Bowen is Associate Professor of Biology

Intricately carved sculptural imagery covers and fills many of the architectural works, which survive in great number.

During my sabbatical in the Spring 2004 semester, I spent a month traveling in India, including the southern town of Hampi, set within a landscape of massive rock ledges and boulders. While the name of Hampi refers to a modern town, it is also used to identify the encompassing ruins of a capital city that flourished from the early 14th century until 1565, when northern invaders ransacked the city and massacred most of its inhabitants. During the 230 years prior to the invasion it was known as Vijayanagara, the City of Victory, and was the center of a Hindu empire. It also prospered through international trade, and was a very cosmopolitan city. The powerful Vijayanagar rulers adorned their capital with vast temple complexes, bazaars, shrines, and a sprawling royal quarter. Intricately carved structural imagery covers and fills many of the architectural works, which survive in great number.